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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/029,144	12/28/2001	Hye Young Kim	2658-0275P	5231

2292 7590 11/03/2003

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EXAMINER	
QI, ZHI QIANG	
ART UNIT	PAPER NUMBER
2871	

DATE MAILED: 11/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/029,144	KIM ET AL.	
	Examiner	Art Unit	
	Mike Qi	2871	

-- The MAILING DATE of this communication appears on the cover sheet with the c rresp ndence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 August 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3 and 5-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 5-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 5-13, 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant admitted prior art (AAPA) in view of US 5,135,581 (Tran et al) and US 6,466,293 (Suzuki et al).

Claims 1 and 13, AAPA discloses (page 1, paragraph 0003 – page 4, paragraph 0012; Figs.1A – 1D) a method of fabricating a pixel electrode and a structure of a pixel electrode in a liquid crystal display comprising:

- a substrate (11);
- a switching device (TFT) for driving the pixel electrode over the substrate (11);
- depositing a protective film (passivation layer 27) over the substrate (11) to cover the switching device;
- defining a contact hole (28) in the protective film (27) to expose the drain electrode (23) of the switching device;
- forming pixel electrode (29) to connect the drain electrode via the contact hole (28);
- forming the pixel electrode (29) in a vacuum chamber.

AAPA does not expressly disclose that the pixel electrode is formed by placing the substrate in a vacuum chamber and injecting hydrogen-containing gas at a temperature of less than 400 °C, and the substrate has a temperature of less than about 200 °C when forming the pixel electrode.

However, Tran discloses (col.2, line 20 - col.3, line 5) forming an electrically conductive oxide composition used as a light transmissive electrode in a device, such as liquid crystal displays, at temperature from about 20 °C to about 300 °C with stabilizing gas such as H_2 or H_2O (hydrogen-containing gas), and such that preventing the damage by high temperature process.

The pixel electrode also is a conductive electrode. The forming process for a conductive electrode is also suitable for the pixel electrode in order to prevent the damage by high temperature process.

Although Tran does not expressly teaches placing the substrate in a vacuum chamber, but the LCD forming process must use a vacuum chamber, and that is a conventional.

Suzuki discloses (col.19, line 43 – col.20, line 32) that a LCD forming process in which the substrates precisely superposed and adhered and then were placed in a vacuum chamber, and then injecting a liquid crystal.

Therefore, forming LCD process must use a vacuum chamber and placing the substrate in a vacuum chamber. Because Tran teaches (col.2, line 20 - col.3, line 5; col.4, lines 24-44) that forming a light transmissive electrodes for use on devices such as liquid crystal displays, so that is suitable for making a pixel electrode, and the making

process performed at a temperature 20 °C to 300 °C with stabilizing gas such as H_2 or H_2O (hydrogen-containing gas) (i.e., less than about 400 °C), and the substrate placed in a vacuum chamber at the depositing process to form the electrode, preferable occurs at a temperature of 25 °C to 150 °C , and that is less than about 200 °C.

Since such making process would prevent the damage by high temperature process.

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to form the pixel electrode by placing the substrate in a vacuum chamber and injecting hydrogen-containing gas at temperature of less than about 400 °C and the substrate has a temperature of less than about 200 °C as claimed in claims 1 and 13 for preventing the damage of a device during the temperature process.

Claims 5 and 19, Tran discloses (col.4, lines 24-44) that preferably, sputter depositing occurs at temperature of from 25 °C to 150 °C, so that means the device damage would be prevented better in this temperature range during the temperature process.

Therefore, when forming the pixel electrode, the substrate using a temperature process, preferably using a temperature between about 50 °C and about 150 °C as claimed in claim 5 would have been at least obvious for achieving a better protection during the temperature process.

Claims 6 and 15, AAPA discloses (page 1, paragraph 0003 - page 4, paragraph 0012; Figs.1A – 1D) that forming a gate electrode (13) over the substrate (11); entirely depositing a gate insulating film (15) over the substrate (11) to cover the gate electrode

(13); and continuously depositing an active layer (17) and an ohmic contact layer (19) to overlap the gate electrode (13).

Claims 7-9 and 16, AAPA discloses (page 1, paragraph 0003 - page 4, paragraph 0012; Figs.1A – 1D) that the passivation layer (27) is made from an inorganic insulating material such as silicon nitride, silicon oxide, etc., or an organic insulating material such as acrylic, polytetrafluoroethylene, benzocyclobutene, fluoropolymer resin and perfluorocyclobutane, etc.

Claims 10-11 and 17, AAPA discloses (page 1, paragraph 0003 - page 4, paragraph 0012; Figs.1A – 1D) that the pixel electrode (29) is formed from the transparent conductive material such as indium tin oxide (ITO), tin oxide (TO) or indium zinc oxide (IZO).

Claims 12 and 18, AAPA discloses (page 1, paragraph 0003 - page 4, paragraph 0012; Figs.1A – 1D) that the source and drain electrodes (21,23) of the switching device is formed from the metallic thin film such as Mo, Cr, Ti, or Ta, etc., or a molybdenum alloy such as MoW, MoTa or MoNb, etc.

3. Claims 2-3, 14, 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant admitted prior art and Tran and Suzuki as applied to claims 1, 5-13, 15-19 above, and further in view of US 6,433,842 (Kaneko et al).

Claims 2-3 and 14, Kaneko discloses (col.5, lines 47 – 51) that the amorphous indium tin oxide (ITO) or indium zinc oxide (IZO) is preferably used as the material of the pixel electrodes, because the amorphous structure allows for use of a weak acid etchant, so that the aluminum alloy is prevented from being damaged during etching of

the pixel electrodes. Kaneko also discloses (col.9, lines 7 – 43) that by using the weak acid, the layered structure underlying the ITO film is secured from being damaged during the etching of the ITO, so that the electrodes underlying the pixel electrodes (ITO) would be secured from being damaged during the etching of the ITO process.

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to use amorphous structure as the pixel electrode and use weak acid etchant during etching process as claimed in claims 2-3 and 14 for securing the electrodes underlying the pixel electrodes from being damaged (such as the electrode erosion) during the etching of the ITO.

Claims 20 and 21 are redundant. Because the claims 1 and 13 already have such limitations such as the substrate has a temperature of less than about 200°C, and the 200°C temperature is a half of the 400°C temperature.

Response to Arguments

4. Applicant's arguments filed on Aug.20, 2003 have been fully considered but they are not persuasive.

Applicant's **only** arguments are as follows:

1) The description of the related art cannot be a prior art.

2) The references do not teach the pixel electrode is formed by placing the substrate in a vacuum chamber and injecting hydrogen-containing gas at a temperature of less than about 400°C, and the substrate has a temperature of less than about 200°C when forming the pixel electrode.

3) The reference Kaneko fails to suggest the temperature differential between the substrate and the vacuum chamber.

Examiner's responses to Applicant's **only** arguments are as follows:

1) Any invention must be based on a prior art such as the conventional Figs. 1A-1D, and that must be a prior art.

2) The reference Tran discloses (col.2, line 20 - col.3, line 5) forming an electrically conductive oxide composition used as a light transmissive electrode in a device, such as liquid crystal displays, at temperature from about 20 °C to about 300 °C with stabilizing gas such as H_2 or H_2O (hydrogen-containing gas), and such that preventing the damage by high temperature process.

The pixel electrode also is a conductive electrode. The forming process for a conductive electrode is also suitable for the pixel electrode in order to prevent the damage by high temperature process.

Although Tran does not expressly teaches placing the substrate in a vacuum chamber, but the LCD forming process must use a vacuum chamber, and that is a conventional.

Suzuki discloses (col.19, line 43 – col.20, line 32) that a LCD forming process in which the substrates precisely superposed and adhered and then were placed in a vacuum chamber, and then injecting a liquid crystal.

Therefore, forming LCD process must use a vacuum chamber and placing the substrate in a vacuum chamber. Because Tran teaches (col.2, line 20 - col.3, line 5; col.4, lines 24-44) that forming a light transmissive electrodes for use on devices such

as liquid crystal displays, so that is suitable for making a pixel electrode, and the making process performed at a temperature 20 °C to 300 °C with stabilizing gas such as H_2 or H_2O (hydrogen-containing gas) (i.e., less than about 400 °C), and the substrate placed in a vacuum chamber at the depositing process to form the electrode, preferable occurs at a temperature of 25 °C to 150 °C , and that is less than about 200 °C.

3) The reference Kaneko is a secondary reference, and Kaneko discloses (col.5, lines 47 – 51) that the amorphous indium tin oxide (ITO) or indium zinc oxide (IZO) is preferably used as the material of the pixel electrodes, because the amorphous structure allows for use of a weak acid etchant, so that the aluminum alloy is prevented from being damaged during etching of the pixel electrodes. Kaneko also discloses (col.9, lines 7 – 43) that by using the weak acid, the layered structure underlying the ITO film is secured from being damaged during the etching of the ITO, so that the electrodes underlying the pixel electrodes (ITO) would be secured from being damaged during the etching of the ITO process.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mike Qi whose telephone number is (703) 308-6213.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Mike Qi
October 18, 2003

T. Chowdhury
Primary Examiner